

**Amendments to the claims:**

**Claims 11-14 are cancelled.**

**Claims 46, 49 and 52 are amended.**

1.- 5. (Cancelled)

1           6.       (Previously Presented)       A spin valve transistor comprising:  
2       an emitter;  
3       a collector;  
4       a base between the emitter and the collector;  
5       a spin valve including:  
6               a ferromagnetic free layer structure;  
7               a self-pinned antiparallel (AP) pinned layer structure without any pinning structure  
8       pinning the self-pinned AP pinned layer structure; and  
9               a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
10       structure; and  
11       the base comprising at least said free layer structure;  
12       the self pinned AP pinned layer structure comprising:  
13               a ferromagnetic first antiparallel (AP) pinned layer;  
14               a ferromagnetic second antiparallel (AP) pinned layer;  
15               a nonmagnetic antiparallel coupling (APC) layer located between the first and  
16       second AP pinned layers;  
17               one of the first and second AP pinned layers having a cobalt iron (CoFe) film with  
18       a positive magnetostriction;  
19               the CoFe film having a magnetostrictive anisotropy field that is oriented  
20       perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
21       layer structure; and  
22               the first and second AP pinned layers having the same magnetic thickness.

1           7.       (Previously Presented) A spin valve transistor comprising:  
2           an emitter;  
3           a collector;  
4           a base between the emitter and the collector;  
5           a spin valve including:  
6                 a ferromagnetic free layer structure composed of iron (Fe);  
7                 a self-pinned antiparallel (AP) pinned layer structure;  
8                 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
9           structure; and  
10           the free layer structure interfacing the spacer layer;  
11           the base comprising at least said free layer structure;  
12           the self pinned AP pinned layer structure including:  
13                 a ferromagnetic first antiparallel (AP) pinned layer;  
14                 a ferromagnetic second antiparallel (AP) pinned layer; and  
15                 a nonmagnetic antiparallel coupling (APC) layer located between the first and  
16           second AP pinned layers;  
17           the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;  
18           the second AP pinned layer including:  
19                 an iron (Fe) film;  
20                 a cobalt iron (CoFe) film with a positive magnetostriction;  
21                 the iron (Fe) film being located between and interfacing the APC layer and the  
22           cobalt iron (CoFe) film; and  
23                 the CoFe film having a magnetostrictive anisotropy field that is oriented  
24           perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
25           layer structure.

1           8.       (Original)     A spin valve transistor as claimed in claim 7 wherein the cobalt iron  
2           is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           9.       (Previously Presented)     A spin valve transistor as claimed in claim 7 wherein the  
2           cobalt iron (CoFe) film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           10.    (Original)     A spin valve transistor as claimed in claim 9 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

11.- 15.       (Cancelled)

1           16.    (Previously Presented)     A magnetic head assembly comprising:  
2 a write head;  
3 a read head adjacent the write head;  
4 the read head including:  
5           ferromagnetic first and second shield layers; and  
6           a spin valve transistor located between the first and second shield layers;  
7 the spin valve transistor comprising:  
8           an emitter;  
9           a collector;  
10          a base between the emitter and the collector;  
11          a spin valve including:  
12               a ferromagnetic free layer structure;  
13               a self-pinned antiparallel (AP) pinned layer structure without any pinning  
14               structure pinning the self-pinned AP pinned layer structure;  
15               a nonmagnetic spacer layer between the free layer structure and the AP  
16               pinned layer structure; and  
17               the base comprising at least said free layer structure;  
18 the self pinned AP pinned layer structure comprising:  
19           a ferromagnetic first antiparallel (AP) pinned layer;  
20           a ferromagnetic second antiparallel (AP) pinned layer;  
21           a nonmagnetic antiparallel coupling (APC) layer located between the first and  
22 second AP pinned layers;  
23           one of the first and second AP pinned layers having a cobalt iron (CoFe) film with  
24 a positive magnetostriction;  
25           the CoFe film having a magnetostrictive anisotropy field that is oriented  
26 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
27 layer structure; and  
28           the first and second AP pinned layers having the same magnetic thickness.

17. (Previously Presented) A magnetic head assembly comprising:  
a write head;  
a read head adjacent the write head;  
the read head including:  
ferromagnetic first and second shield layers; and  
a spin valve transistor located between the first and second shield layers;  
the spin valve transistor comprising:  
an emitter;  
a collector;  
a base between the emitter and the collector;  
a spin valve including:  
a ferromagnetic free layer structure composed of iron (Fe);  
a self-pinned antiparallel (AP) pinned layer structure;  
a nonmagnetic spacer layer between the free layer structure and the AP  
pinned layer structure; and  
the free layer structure interfacing the spacer layer;  
the base comprising at least said free layer structure;  
the self pinned AP pinned layer structure including:  
a ferromagnetic first antiparallel (AP) pinned layer;  
a ferromagnetic second antiparallel (AP) pinned layer; and  
a nonmagnetic antiparallel coupling (APC) layer located between the first and  
second AP pinned layers;  
the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;  
the second AP pinned layer including:  
an iron (Fe) film;  
a cobalt iron (CoFe) film with a positive magnetostriction;  
the iron (Fe) film being located between and interfacing the APC layer and the  
cobalt iron (CoFe) film; and  
the CoFe film having a magnetostrictive anisotropy field that is oriented  
perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
layer structure.

1            18.    (Previously Presented)    A magnetic head assembly as claimed in claim 17 wherein  
2 the cobalt iron is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1            19.    (Previously Presented)    A magnetic head assembly as claimed in claim 17 wherein  
2 the cobalt iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1            20.    (Original)    A magnetic head assembly as claimed in claim 19 wherein the first  
2 and second AP pinned layers have the same magnetic thickness.

1            21.    (Withdrawn)    A magnetic head assembly as claimed in claim 16 further  
2 comprising:  
3            the second AP pinned layer being composed of iron (Fe);  
4            the first AP pinned layer including:  
5                    first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer  
6            layer;  
7                    said cobalt iron (CoFe) film; and  
8                    the cobalt iron (CoFe) film being located between and interfacing the first and  
9            second iron (Fe) film.

1            22.    (Withdrawn)    A magnetic head assembly as claimed in claim 21 wherein the  
2 cobalt iron film is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1            23.    (Withdrawn)    A magnetic head assembly as claimed in claim 22 wherein the cobalt  
2 iron film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1            24.    (Withdrawn)    A magnetic head assembly as claimed in claim 23 wherein the first  
2 and second AP pinned layers have the same magnetic thickness.

25.    (Cancelled)

26. (Previously Presented) A magnetic disk drive comprising:  
at least one magnetic head assembly that has a head surface;  
the magnetic head assembly having a write head and a read head;  
the read head including:  
ferromagnetic first and second shield layers; and  
a spin valve transistor located between the first and second shield layers;  
the spin valve transistor comprising:  
an emitter;  
a collector;  
a base between the emitter and the collector;  
a spin valve including:  
a ferromagnetic free layer structure;  
a self-pinned antiparallel (AP) pinned layer structure without any pinning structure  
pinning the self-pinned AP pinned layer structure;  
a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
structure; and  
the base comprising at least said free layer structure;  
the self pinned AP pinned layer structure comprising:  
a ferromagnetic first antiparallel (AP) pinned layer;  
a ferromagnetic second antiparallel (AP) pinned layer;  
a nonmagnetic antiparallel coupling (APC) layer located between the first and  
second AP pinned layers;  
one of the first and second AP pinned layers having a cobalt iron (CoFe) film with  
a positive magnetostriction;  
the CoFe film having a magnetostrictive anisotropy field that is oriented  
perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
layer structure; and  
the first and second AP pinned layers having the same magnetic thickness;  
a housing;  
a magnetic medium supported in the housing;

31 a support mounted in the housing for supporting the magnetic head assembly with said head  
32 surface facing the magnetic medium so that the magnetic head assembly is in a transducing  
33 relationship with the magnetic medium;  
34 a motor for moving the magnetic medium; and  
35 a processor connected to the magnetic head assembly and to the motor for exchanging  
36 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 27. (Previously Presented) A magnetic disk drive comprising:  
2 at least one magnetic head assembly that has a head surface;  
3 the magnetic head assembly having a write head and a read head;  
4 the read head including:  
5 ferromagnetic first and second shield layers; and  
6 a spin valve transistor located between the first and second shield layers;  
7 the spin valve transistor comprising:  
8 an emitter;  
9 a collector;  
10 a base between the emitter and the collector;  
11 a spin valve including:  
12 a ferromagnetic free layer structure composed of iron (Fe);  
13 a self-pinned antiparallel (AP) pinned layer structure;  
14 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
15 structure; and  
16 the free layer structure interfacing the spacer layer;  
17 the base comprising at least said free layer structure;  
18 the self pinned AP pinned layer structure including:  
19 a ferromagnetic first antiparallel (AP) pinned layer;  
20 a ferromagnetic second antiparallel (AP) pinned layer; and  
21 a nonmagnetic antiparallel coupling (APC) layer located between the first and  
22 second AP pinned layers;  
23 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;  
24 the second AP pinned layer including:  
25 an iron (Fe) film with a positive magnetostriction;

26 a cobalt iron (CoFe) film;  
27 the iron (Fe) film being located between and interfacing the APC layer and the  
28 cobalt iron (CoFe) film; and  
29 the CoFe film having a magnetostrictive anisotropy field that is oriented  
30 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
31 layer structure;  
32 a housing;  
33 a magnetic medium supported in the housing;  
34 a support mounted in the housing for supporting the magnetic head assembly with said head  
35 surface facing the magnetic medium so that the magnetic head assembly is in a transducing  
36 relationship with the magnetic medium;  
37 a motor for moving the magnetic medium; and  
38 a processor connected to the magnetic head assembly and to the motor for exchanging  
39 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 28. (Original) A magnetic disk drive as claimed in claim 27 wherein the cobalt iron  
2 is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1 29. (Previously Presented) A magnetic disk drive as claimed in claim 27 wherein the  
2 cobalt iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1 30. (Original) A magnetic disk drive as claimed in claim 29 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1 31. (Withdrawn) A magnetic disk drive as claimed in claim 26 further comprising:  
2 the second AP pinned layer being composed of iron (Fe);  
3 the first AP pinned layer including:  
4 first and second iron (Fe) films with the first iron (Fe) layer film interfacing the  
5 spacer layer;  
6 said cobalt iron (CoFe) film; and  
7 the cobalt iron (CoFe) film being located between and interfacing the first and  
8 second iron (Fe) film.



1           32.   (Withdrawn)   A magnetic disk drive as claimed in claim 31 wherein the cobalt  
2 iron is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           33.   (Withdrawn)   A magnetic disk drive as claimed in claim 32 wherein the cobalt  
2 iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           34.   (Withdrawn)   A magnetic disk drive as claimed in claim 33 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           35.   (Previously Presented)   A spin valve transistor as claimed in claim 9 wherein the  
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           36.   (Previously Presented)   A spin valve transistor as claimed in claim 35 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes  
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of  
4 the layers in said base.

1           37.   (Previously Presented)   A spin valve transistor as claimed in claim 36 wherein  
2 the first and second AP pinned layers have the same magnetic thickness.

1           38.   (Previously Presented)   A magnetic head assembly as claimed in claim 19  
2 wherein the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the  
3 spacer layer.

1           39.   (Previously Presented)   A magnetic head assembly as claimed in claim 38 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes  
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of  
4 the layers in said base.

1           40.   (Previously Presented)   A magnetic head assembly as claimed in claim 39  
2 wherein the first and second AP pinned layers have the same magnetic thickness.

1           41.   (Previously Presented)   A magnetic disk drive as claimed in claim 29 wherein the  
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           42.   (Previously Presented)   A magnetic disk drive as claimed in claim 41 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes  
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of  
4 the layers in said base.

1           43.   (Previously Presented)   A magnetic disk drive as claimed in claim 42 wherein the  
2 first and second AP pinned layers have the same magnetic thickness.

1           44.   (Previously Presented)   A spin valve transistor as claimed in claim 6 wherein at  
2 least one of the AP pinned layers is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           45.   (Previously Presented)   A spin valve transistor as claimed in claim 44 wherein  
2 the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer  
3 layer.

1           46.   (Currently Amended)   A spin valve transistor as claimed in claim 45 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot ~~electrodes~~  
3 electrons from the emitter to the base wherein the hot electrons have an energy level above Fermi  
4 levels of the layers in said base.

1           47.   (Previously Presented)   A magnetic head assembly as claimed in claim 16 wherein  
2 at least one of the AP pinned layers is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           48.   (Previously Presented)   A magnetic head assembly as claimed in claim 47 wherein  
2 the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer  
3 layer.

1           49.     (Currently Amended)   A magnetic head assembly as claimed in claim 48 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot ~~electrodes~~  
3 electrons from the emitter to the base wherein the hot electrons have an energy level above Fermi  
4 levels of the layers in said base.

1           50.     (Previously Presented)   A magnetic disk drive as claimed in claim 26 wherein at  
2 least one of the AP pinned layers is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           51.     (Previously Presented)   A magnetic disk drive as claimed in claim 50 wherein the  
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           52.     (Currently Amended)   A magnetic disk drive as claimed in claim 51 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot ~~electrodes~~  
3 electrons from the emitter to the base wherein the hot electrons have an energy level above Fermi  
4 levels of the layers in said base.